Isolation, characterization and application for phage bio control of bacteriophages infecting *Acidovorax citrulli*, the causal agent of bacterial fruit blotch

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Statement of Problems: Bacterial fruit blotch (BFB) is an economically important bacterial disease that has caused huge economic losses in melon and watermelon crops around the world. There is no commercially available cultivars resistance to this disease caused by bacteria *Acidovorax citrulli*. Mainly, two genotypes (genotype I and II) are reported in *A. citrulli,* in which genotype II is the main causal agent of BFB in water melon that is major problem in Korea.

Methodology & Theoretical Orientation: We have isolated more than 50 bacteriophages infecting *A. citrulli,* from watermelon leaf samples which were collected from different parts of Korea. Two of the isolated phages with large plaque size named as ACP17 and ACPHW were further characterized and used for phage biocontrol.

Findings: Based on electron microscope observations, ACP17 belongs to Myoviridae family with head diameter 100±5 nm and a tail length of 150±5 nm while ACPHW has a head size of 60±5 nm and tail size 180±5 nm which belongs to Siphoviridae family. Among forty *A. citrulli* strains, ACP17 can lyse 27 strains of which most belongs to genotype I, and ACPHW can lyse 39 strains containing group I and II. In planta assay showed that the germination rate of watermelon seeds coated with the bacteriophages was up to 80% in the presence of *A. citrulli* contrast to untreated seed showing no germination. Also, these germinated plants showed 100% survival in *A. citrulli* treated soil.

Conclusion & Significance: These results suggest the possible use of these phages as an effective bio control agent for BFB.

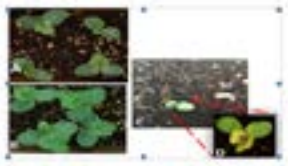

Figure: In planta assay with phage coated seeds. A: Normal seeds as control, B: Phage coated seed + *A. citrulli* inoculation C: Normal seeds + *A. citrulli* inoculation, D: BFB symptoms on an infected seedling.

Recent Publications

1. Rahimi Midani A, Lee S, Kang S W, Kim M K and Choi T J (2018) First isolation and molecular characterization of bacteriophages infecting *Acidovorax citrulli*, the causal agent of bacterial fruit blotch. The Plant Pathology Journal 34(1): 59–64.
2. Frampton R A, Pitman A R and Finerann P C (2012) Advances in bacteriophage-mediated control of plant pathogens. International Journal of Food Microbiology Article ID 326452:1-11.
3. Zivanovic M and Walcott R R (2016) Further characterization of genetically distinct groups of *Acidovorax citrulli* strains. Phytopathology 107(1):29-35.
4. Borah P K, Jindal J K and Verma J P (2000) Integrated management of bacterial leaf spot of mungbean with bacteriophages of Xav and chemicals. J. Mycol. Plant Pathol 30:19-21.

Biography

Tae Jin Choi has completed his PhD from University of California, Berkeley in 1993 and 2 years Postdoctoral studies from University of Wisconsin, Madison. Since 1995 he is working as a Professor in Pukyong National University in Busan Korea. He had published over 70 papers on the viruses of plant, fish, shrimp and vaccines for aquatic viruses. Recently he is working on the development of microalgae as bioreactor for recombinant protein production and bacteriophage biocontrol of water melon.

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